

MN54F407-X REV 1A0

 Original Creation Date: 05/03/96
 Last Update Date: 07/30/96
 Last Major Revision Date: 05/03/96

DATA ACCESS REGISTER

General Description

The F407 Data Access Register (DAR) performs memory address arithmetic for RAM resident stack applications. It contains three 4-bit registers intended for Program Counter (R0), Stack Pointer (R1), and Operand Address (R2). The F407 implements 16 instructions which allow either pre- or post-decrement/increment and register-to-register transfer in a single clock cycle. It is expandable in 4-bit increments and can operate at a 30 MHz microinstruction rate on a 16-bit word. The TRI-STATE outputs are provided for bus-oriented applications. The F407 is fully compatible with all TTL families.

Industry Part Number

54F407

NS Part Numbers

 54F407DMQB
 54F407FMQB
 54F407LMQB

Prime Die

M407

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- High-speed-greater than a 30 MHz microinstruction rate
- Three 4-bit registers
- 16 instruction for register manipulation
- Two separate output ports, one transparent
- Relative addressing capability
- TRI-STATE Outputs
- Optional pre- or post- arithmetic
- Expandable in multiples of four bits
- 24-pin slim package
- 9407 replacement

(Absolute Maximum Ratings)

(Note 1)

Storage Temperature	-65 C to +150 C
Ambient Temperature under Bias	-55C to +125C
Junction Temperature under Bias	-55C to +125C
Vcc Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0mA
Voltage Applied to Output in HIGH State (with Vcc=0V)	
Standard Output	-0.5V to Vcc
TRI-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated Iol(mA)

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Free Air Ambient Temperature	
Commercial	0 C to +70 C
Military	-55 C to +125 C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC 4.5V to 5.5V, Temp range: -55C to 125C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	Input High Current	VCC=5.5V, VM=2.7V, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		20	uA	1, 2, 3
IBVI	Input High Current	VCC=5.5V, VM=7.0V, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		100	uA	1, 2, 3
IIL	Input LOW Current	VCC=5.5V, VM=0.5V, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		-0.4	mA	1, 2, 3
VOL (1)	Output LOW Voltage	VCC=4.5V, VIL=0.7V, IOL=8.0mA, VIH=2.0V, VINH=5.5V, VINL=0.0V	1, 3	OUT EXCEPT PIN 13		0.5	V	1, 2, 3
VOH (1)	Output HIGH Voltage	VCC=4.5V, VIH=2.0V, IOH=-2.0mA, VIL=0.7V, VINH=5.5V, VINL=0.0V	1, 3	OUT EXCEPT PIN 13	2.4		V	1, 2, 3
IOS	Short-Circuit Current	VCC=5.5V, VINH=5.5V, VM=0.0V, VINL=0.0V	1, 3	OUTPUTS	-20	-130	mA	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IM=-18mA, VINH=5.5V, VINL=0.0V	1, 3	INPUTS		-1.5	mA	1, 2, 3
ICC	Supply Current	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 3	VCC		145	mA	1, 2, 3
ICEX	Output HIGH Leakage Current	VCC=5.5V, VINH=5.5V, VINL=0.0V, VM=5.5V	1, 3	OUTPUTS		250	uA	1, 2, 3
VOL (2)	Output LOW Voltage	VCC=4.5V, VIL=0.7V, VIH=2.0V, IOL=4.0mA, VINH=5.5V, VINL=0.0V	1, 3	OUT PIN 13 ONLY		0.5	V	1, 2, 3
VOH (2)	Output HIGH Voltage	VCC=4.5V, VIL=0.7V, VIH=2.0V, IOH=-400uA, VINH=5.5V, VINL=0.0V	1, 3	OUT PIN 13 ONLY	2.4		V	1, 2, 3
IOZH	Output Leakage Current PINS 8,9,10,11,14,18,20	VCC=5.5V, VIL=0.7V, VIH=2.0V, VM=2.7, VINH=5.5V, VINL=0.0V	1, 3	OUTPUTS		100	uA	1, 2, 3
IOZL	Output Leakage Current PINS 8,9,10,11,14,18,20	VCC=5.5V, VIL=0.7V, VIH=2.0V, VM=0.5V, VINH=5.5V, VINL=0.0V	1, 3	OUTPUTS		-100	uA	1, 2, 3

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS

tpLH(1)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @ -55/125C	2, 4	CP to On	7.0	16.5	ns	9
			2, 4	CP to On	7.0	24.0	ns	10, 11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(1)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to On	4.0	9.5	ns	9
			2, 4	CP to On	4.0	15.0	ns	10, 11
tpLH(2)	Propagation Delay I1-I3 to X0-X3, I0=LOW	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		7.5	17.0	ns	9
			2, 4		7.5	21.0	ns	10, 11
tpHL(2)	Propagation Delay I1-I3 to X0-X3, I0=LOW	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		8.0	18.5	ns	9
			2, 4		8.0	25.0	ns	10, 11
tpLH(3)	Propagation Delay I1-I3 to X0-X3, I0=HIGH	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		8.5	31.0	ns	9
			2, 4		8.5	50.0	ns	10, 11
tpHL(3)	Propagation Delay I1-I3 to X0-X3, I0=HIGH	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		6.5	22.5	ns	9
			2, 4		6.5	35.0	ns	10, 11
tpLH(4)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to Xn, I0=LOW	7.0	17.5	ns	9
			2, 4	CP to Xn, I0=LOW	7.0	24.0	ns	10, 11
tpHL(4)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to Xn, I0=LOW	8.5	24.0	ns	9
			2, 4	CP to Xn, I0=LOW	8.5	28.0	ns	10, 11
tpLH(5)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to Xn, I0=HIGH	16.0	35.0	ns	9
			2, 4	CP to Xn, I0=HIGH	16.0	43.0	ns	10, 11
tpHL(5)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to Xn, I0=HIGH	11.5	28.5	ns	9
			2, 4	CP to Xn, I0=HIGH	11.5	36.5	ns	10, 11
tpLH(6)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	Dn to Xn	6.5	19.5	ns	9
			2, 4	Dn to Xn	6.5	29.0	ns	10, 11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(6)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	D $\bar{n}$ to Xn	3.0	12.0	ns	9
			2, 4	D $\bar{n}$ to Xn	3.0	20.5	ns	10, 11
tpLH(7)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CI to Xn	4.0	14.0	ns	9
			2, 4	CI to Xn	4.0	22.0	ns	10, 11
tpHL(7)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CI to Xn	4.5	12.0	ns	9
			2, 4	CI to Xn	4.5	14.0	ns	10, 11
tpLH(8)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	IO to Xn	4.0	11.5	ns	9
			2, 4	IO to Xn	4.0	14.5	ns	10, 11
tpHL(8)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	IO to Xn	3.0	13.0	ns	9
			2, 4	IO to Xn	3.0	19.5	ns	10, 11
tpLH(9)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to CO	9.0	24.5	ns	9
			2, 4	CP to CO	9.0	33.0	ns	10, 11
tpHL(9)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CP to CO	6.5	25.0	ns	9
			2, 4	CP to CO	6.5	38.0	ns	10, 11
tpLH(10)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CI to CO	3.0	8.5	ns	9
			2, 4	CI to CO	3.0	11.0	ns	10, 11
tpHL(10)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	CI to CO	3.0	9.0	ns	9
			2, 4	CI to CO	3.0	10.0	ns	10, 11
tpLH(11)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	D $\bar{n}$ to CO	3.0	7.5	ns	9
			2, 4	D $\bar{n}$ to CO	3.0	10.0	ns	10, 11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(11)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	D $\bar{n}$ to C $\bar{O}$	3.5	9.0	ns	9
			2, 4	D $\bar{n}$ to C $\bar{O}$	3.5	10.0	ns	10, 11
tpLH(12)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	I1-I3 to C $\bar{O}$	8.0	20.0	ns	9
			2, 4	I1-I3 to C $\bar{O}$	8.0	23.0	ns	10, 11
tpHL(12)	Propagation Delay	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4	I1-I3 to C $\bar{O}$	6.0	21.0	ns	9
			2, 4	I1-I3 to C $\bar{O}$	6.0	32.5	ns	10, 11
tpZH(1)	Enable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		4.5	15.5	ns	9
tpZH(1)	Enable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		4.5	26.0	ns	10, 11
tpZL(1)	Enable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		3.5	13.0	ns	9
tpZL(1)	Enable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		3.5	16.0	ns	10, 11
tpHZ(2)	Disable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		2.0	7.0	ns	9
tpHZ(2)	Disable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		2.0	9.0	ns	10, 11
tpLZ(2)	Disable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		5.0	16.5	ns	9
tpLZ(2)	Disable Time E $\bar{O}0$ to $\bar{O}n$ or E $\bar{O}X$ to Xn	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	2, 4		5.0	18.0	ns	10, 11
tcw		VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5	CLOCK PERIOD	32.0		ns	9
			5	CLOCK PERIOD	36.0		ns	10, 11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ts(H/L)(1)	Setup Time HIGH or LOW	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5	I1-I3 to CP	4.0		ns	9
			5	I1-I3 to CP	4.5		ns	10, 11
th(H/L)(1)	Hold Time HIGH or LOW	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5	I1-I3 to CP	0		ns	9, 10, 11
ts(H/L)(2)	Setup Time $\overline{Dn}$ or $\overline{CI}$ to Neg. CP	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5		16.5		ns	9
ts(H/L)(2)	Setup Time $\overline{Dn}$ or $\overline{CI}$ to Neg. CP	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5		18.5		ns	10, 11
th(H/L)(2)	Hold Time $\overline{Dn}$ or $\overline{CI}$ to Neg. CP	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5		0		ns	9, 10, 11
ts(H/L)(3)	Setup Time $\overline{CI}$ to Pos. CP	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5		13.0		ns	9
ts(H/L)(3)	Setup Time $\overline{CI}$ to Pos. CP	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5		14.5		ns	10, 11
th(H/L)(3)	Hold Time $\overline{CI}$ to Pos. CP	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5		0		ns	9, 10, 11
tw (H/L)	CLOCK PULSE WIDTH	VCC=5.0V @ 25C, VCC=4.5V & 5.5V @-55/125C	5	CLOCK PULSE WIDTH	7.5		ns	9
			5	CLOCK PULSE WIDTH	8.5		ns	10, 11

Note 1: Screen tested 100% on each device at -55 C, +25 C & +125 C temperature, Subgroups A1, 2, 3, 7 & 8.

Note 2: Screen tested 100% on each device at +25 C temperature only, Subgroup A9.

Note 3: Sample tested (Method 5005, Table 1) on each MFG. lot at +25 C, +125 C & -55 C temp., Subgroups A1, 2, 3, 7 & 8.

Note 4: Sample Tested (Method 5005, Table 1) on each MFG. lot at +25 C Subgroup A9, & periodically at +125 C & -55 C temp., Subgroups 10 & 11.

Note 5: Not tested at +25C, +125C, or -55C Temperature. (DESIGN CHARACTERIZATION DATA).